



**Turban, Aronson, and Liang
Decision Support Systems and Intelligent Systems,
Seventh Edition**

Chapter 9 Knowledge Management





Learning Objectives

- Define knowledge.
- Learn the characteristics of knowledge management.
- Describe organizational learning.
- Understand the knowledge management cycle.
- Understand knowledge management system technology and how it is implemented.
- Learn knowledge management approaches.
- Understand the activities of the CKO and knowledge workers.
- Describe the role of knowledge management in the organization.
- Be able to evaluate intellectual capital.
- Understand knowledge management systems implementation.
- Illustrate the role of technology, people, and management with regards to knowledge management.
- Understand the benefits and problems of knowledge management initiatives.
- Learn how knowledge management can change organizations.



Siemens Knows What It Knows Through Knowledge Management Vignette

- Knowledge management
 - Community of interest
 - Repositories
 - Communities of practice
 - Informal knowledge-sharing techniques
 - Employee initiated
- Created ShareNet
 - Easy to share knowledge
 - Incentives for posting
 - Internal evangelists responsible for training, monitoring, and assisting users
 - Top management support



Knowledge Management

- Process to help organization identify, select, organize, disseminate, transfer information
- Structuring enables problem-solving, dynamic learning, strategic planning, decision-making
- Leverage value of intellectual capital through reuse



Knowledge

- Data = collection of facts, measurements, statistics
- Information = organized data
- Knowledge = contextual, relevant, actionable information
 - Strong experiential and reflective elements
 - Good leverage and increasing returns
 - Dynamic
 - Branches and fragments with growth
 - Difficult to estimate impact of investment
 - Uncertain value in sharing
 - Evolves over time with experience



Knowledge

- Explicit knowledge
 - Objective, rational, technical
 - Policies, goals, strategies, papers, reports
 - Codified
 - Leaky knowledge
- Tacit knowledge
 - Subjective, cognitive, experiential learning
 - Highly personalized
 - Difficult to formalize
 - Sticky knowledge

Table 1 Senses of the term 'to know'

No.	Dictionary definition	Example
1	To perceive directly, to have cognition of	I know it is raining
11	To have full information of	I know everything there is to know about widgets
12	To know things from information	I know there is a train at 5.32
4	To recognize as the same or as familiar	I know that voice
5	To be acquainted with (people) (organisation)	I know your mother I know your school
8	To have experience of	I have known the cares of office
13	To be acquainted with emotions and situations	I know the feeling; I know how you feel; I know how stressful an exam is
7	To have practical understanding of; to have a skill	I know how to use Excel; I know how to play the piano
9	To have fixed in the mind; to learn	I know my French verbs
2	To have understanding of	I know how a diesel engine works
3	To recognize the nature of	I know that lump is benign
6	To be aware of the truth of; to be certain of	I know she is lying
10	To be able to distinguish	I know right from wrong



Knowledge Management

- Systematic and active management of ideas, information, and knowledge residing within organization's employees
- Knowledge management systems
 - Use of technologies to manage knowledge
 - Used with turnover, change, downsizing
 - Provide consistent levels of service



Organizational Learning

- Learning organization
 - Ability to learn from past
 - To improve, organization must learn
 - Issues
 - Meaning, management, measurement
 - Activities
 - Problem-solving, experimentation, learning from past, learning from acknowledged best practices, transfer of knowledge within organization
 - Must have organizational memory, way to save and share it
- Organizational learning
 - Develop new knowledge
 - Corporate memory critical
- Organizational culture
 - Pattern of shared basic assumptions



Knowledge Management Initiatives

- Aims
 - Make knowledge visible
 - Develop knowledge intensive culture
 - Build knowledge infrastructure
- Surrounding processes
 - Creation of knowledge
 - Sharing of knowledge
 - Seeking out knowledge
 - Using knowledge



Knowledge Management Initiatives

- Knowledge creation
 - Generating new ideas, routines, insights
 - Modes
 - Socialization, externalization, internalization, combination
- Knowledge sharing
 - Willing explanation to another directly or through an intermediary
- Knowledge seeking
 - Knowledge sourcing



Everyday propositional knowledge

This form of knowledge is our everyday, commonsense, relatively direct awareness of the world around us. To know in this sense is to know that – to be aware of or to be cognizant of states of affairs. It is to know that it is raining, that there is someone at the door, that there is a train at 12.15, that there are 35 widgets in stock or that the petrol tank is half-full. I call it propositional knowledge, in comparison with the other forms, because it is generally explicit and conscious, and can be represented in the form of propositional statements: ‘I know that x is or was the case’ (Klein, 1971).



Experiential knowledge

We talk about knowing in this sense when we are referring to our own individual previous experience, particularly of people, places, events or feelings. To know in this sense is to be acquainted with or to be familiar with. Thus, I know Mary Scott, I know Birmingham, I know 'that feeling', I don't know your school, or I know how bad toothache can be.



Performative knowledge

Performative knowledge involves having some skill or competence in order to be able to do something – it is to know how rather than to know or to know that (Polanyi, 1958; Ryle, 1963). I include in this category much more than simple physical skills. So, we can talk of knowing how to ride a bike, knowing how to play the piano, knowing how to speak a language, knowing how to ‘play the game’ as in office politics or a sport, knowing how to parent, or knowing how to cook.



Epistemological knowledge

By epistemological knowledge, I am signalling a move away from the everyday knowing that things are the case towards deeper understandings of why things are as they are. It is to know why, to be knowledgeable about, to know the truth of, to be certain of, or to understand. It can be seen as related to or a development of everyday propositional knowledge and I would include within this category what we call scientific knowledge – very much the subject of CR. I have called it epistemological knowledge to indicate that it is the most self-conscious about its validity and, more than the other forms of knowledge, is centrally characterized by its concern for truth. It should not be confused with Habermas's epistemic (discursive) approach.



Table 2 Forms of knowledge and truth

<i>Type of knowledge</i>	<i>Object of knowledge</i>	<i>Source of knowledge</i>	<i>Form of representation</i>	<i>Criteria for validity</i>
Propositional I know it is raining I know there is a train at 3.00 I know there is someone at the door	States of affairs in the physical and social world. <i>To know that x</i>	Direct perception, receipt of information, communications, the media	Generally explicit and propositional although some may be tacit	<i>(Ontological) truth</i> <u>Referential-expressive</u>
Experiential I know her well I know the feeling I know I left my key there I know how the system works	People, places, events we know through personal experience. <i>To know x</i>	Personal experiences	Memories, some aspects of which may be tacit and embodied	<i>Sincerity</i> <u>Normative-fiduciary</u> <u>Adequating</u>
Performative I know how to ride I know how to read an X-Ray I know how to present	Skills, abilities and competences <i>To know how to do x</i>	Personal experience, learning, training	Embodied	<i>Competence,</i> <i>(Epistemic) rightness</i> <u>Alethic</u>
Epistemological I know what black holes are I know linear algebra	Reasons for the (non-) occurrence of things and events. <i>To know why x</i>	Formal methods of discovery, for example, in science	Explicit, discursive, 'objective', open to debate.	<i>Truth, rightness,</i> <i>sincerity</i> <u>Ontological, alethic</u>

Habermas's validity claims.

Bhaskar's four dimensions.



Approaches to Knowledge Management

- Process Approach
 - Codifies knowledge
 - Formalized controls, approaches, technologies
 - Fails to capture most tacit knowledge
- Practice Approach
 - Assumes that most knowledge is tacit
 - Informal systems
 - Social events, communities of practice, person-to-person contacts
 - Challenge to make tacit knowledge explicit, capture it, add to it, transfer it



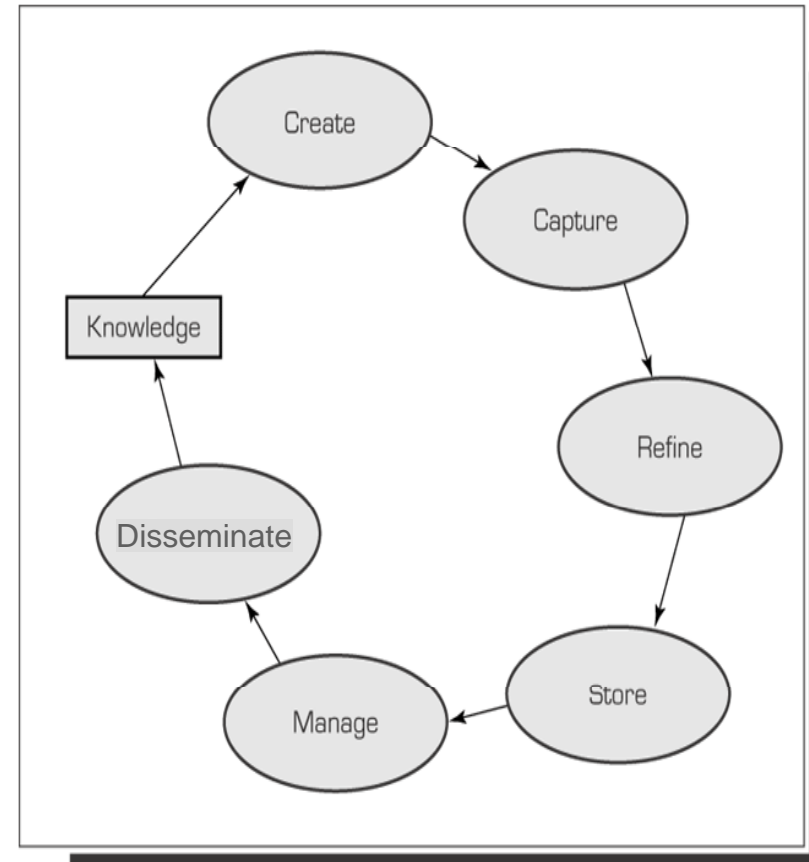
Approaches to Knowledge Management

- Hybrid Approach
 - Practice approach initially used to store explicit knowledge
 - Tacit knowledge primarily stored as contact information
 - Best practices captured and managed
- Best practices
 - Methods that effective organizations use to operate and manage functions
- Knowledge repository
 - Place for capture and storage of knowledge
 - Different storage mechanisms depending upon data captured

Knowledge Management System Cycle

- Creates knowledge through new ways of doing things
- Identifies and captures new knowledge
- Places knowledge into context so it is usable
- Stores knowledge in repository
- Reviews for accuracy and relevance
- Makes knowledge available at all times to anyone

Figure 9.2 The Knowledge Management Cycle





Components of Knowledge Management Systems

- Technologies
 - Communication
 - Access knowledge
 - Communicates with others
 - Collaboration
 - Perform group work
 - Synchronous or asynchronous
 - Same place/different place
 - Storage and retrieval
 - Capture, storing, retrieval, and management of both explicit and tacit knowledge through collaborative systems



Components of Knowledge Management Systems

- Supporting technologies
 - **Artificial intelligence**
 - Expert systems, neural networks, fuzzy logic, intelligent agents
 - **Intelligent agents**
 - Systems that learn how users work and provide assistance
 - **Knowledge discovery in databases**
 - Process used to search for and extract information
 - Internal = data and document mining
 - External = model marts and model warehouses
 - **XML**
 - Extensible Markup Language
 - Enables standardized representations of data
 - Better collaboration and communication through portals



Knowledge Management System Implementation

- Challenge to identify and integrate components
 - Early systems developed with networks, groupware, databases
- Know ware
 - Technology tools that support knowledge management
 - Collaborative computing tools
 - Groupware
 - Knowledge servers
 - Enterprise knowledge portals
 - Document management systems
 - Content management systems
 - Knowledge harvesting tools
 - Search engines
 - Knowledge management suites
 - Complete out-of-the-box solutions



Knowledge Management System Implementation

- Implementation
 - Software packages available
 - Include one or more tools
 - Consulting firms
 - Outsourcing
 - Application Service Providers



Knowledge Management System Integration

- Integration with enterprise and information systems
 - DSS/BI
 - Integrates models and activates them for specific problem
 - Artificial Intelligence
 - Expert system = if-then-else rules
 - Natural language processing = understanding searches
 - Artificial neural networks = understanding text
 - Artificial intelligence based tools = identify and classify expertise



Knowledge Management System Integration

- Database
 - Knowledge discovery in databases
- CRM
 - Provide tacit knowledge to users
- Supply chain management systems
 - Can access combined tacit and explicit knowledge
- Corporate intranets and extranets
 - Knowledge flows more freely in both directions
 - Capture knowledge directly with little user involvement
 - Deliver knowledge when system thinks it is needed



Human Resources

- Chief knowledge officer
 - Senior level
 - Sets strategic priorities
 - Defines area of knowledge based on organization mission and goals
 - Creates infrastructure
 - Identifies knowledge champions
 - Manages content produced by groups
 - Adds to knowledge base
- CEO
 - Champion knowledge management
- Upper management
 - Ensures availability of resources to CKO
- Communities of practice
- Knowledge management system developers
 - Team members that develop system
- Knowledge management system staff
 - Catalog and manage knowledge



Knowledge Management Valuation

- Asset-based approaches
 - Identifies intellectual assets
 - Focuses on increasing value
- Knowledge linked to applications and business benefits approaches
 - Balanced scorecard
 - Economic value added
 - Inclusive valuation methodology
 - Return on management ratio
 - Knowledge capital measure
- Estimated sale price approach



Metrics

- Financial
 - ROI
 - Perceptual, rather than absolute
 - Intellectual capital not considered an asset
- Non-financial
 - Value of intangibles
 - External relationship linkages capital
 - Structural capital
 - Human capital
 - Social capital
 - Environmental capital



Factors Leading to Success and Failure of Systems

- Success
 - Companies must assess need
 - System needs technical and organizational infrastructure to build on
 - System must have economic value to organization
 - Senior management support
 - Organization needs multiple channels for knowledge transfer
 - Appropriate organizational culture
- Failure
 - System does not meet organization's needs
 - Lack of commitment
 - No incentive to use system
 - Lack of integration



Further concepts



Knowledge Perspective

- Representation
 - A mode of representation(Model)
 - Can be understood
- Production
 - Manufacturing knowledge
 - Transfer of inventories from one to another
- States
 - Each state used for different Knowledge



Six states of Knowledge

- Data
- Information
- Structured information
- Insight
- Judgment
- Decision



Where Knowledge Live

- Internal sources
 - Tapped through Knowledge derivation
 - Using the existing knowledge of problem context
- External sources
 - Through Active communication
 - Through passive ways (observation/ gathering methods)



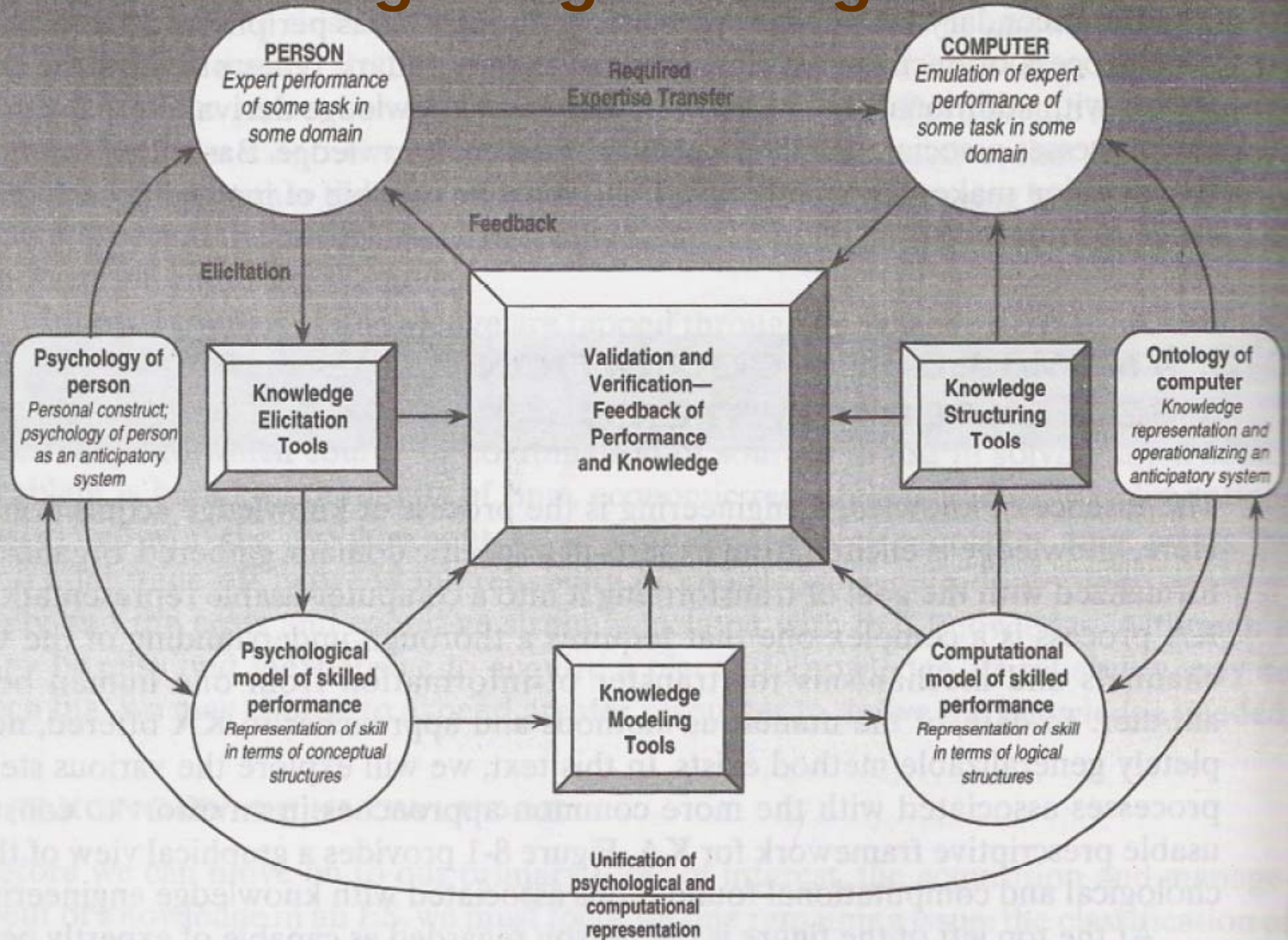
Knowledge types

- Primary
 - Descriptive :
 - data, information , past , present and future state
 - Procedural : How to do something
 - Reasoning : codes of conduct, Rules,...
- Secondary
 - Linguistics : vocabulary, grammar
 - Assimilative: relevancy filters,
 - Presentation :
 - Mode of communication , messaging, graphing ,...



Knowledge Acquisition

Knowledge Engineering Process

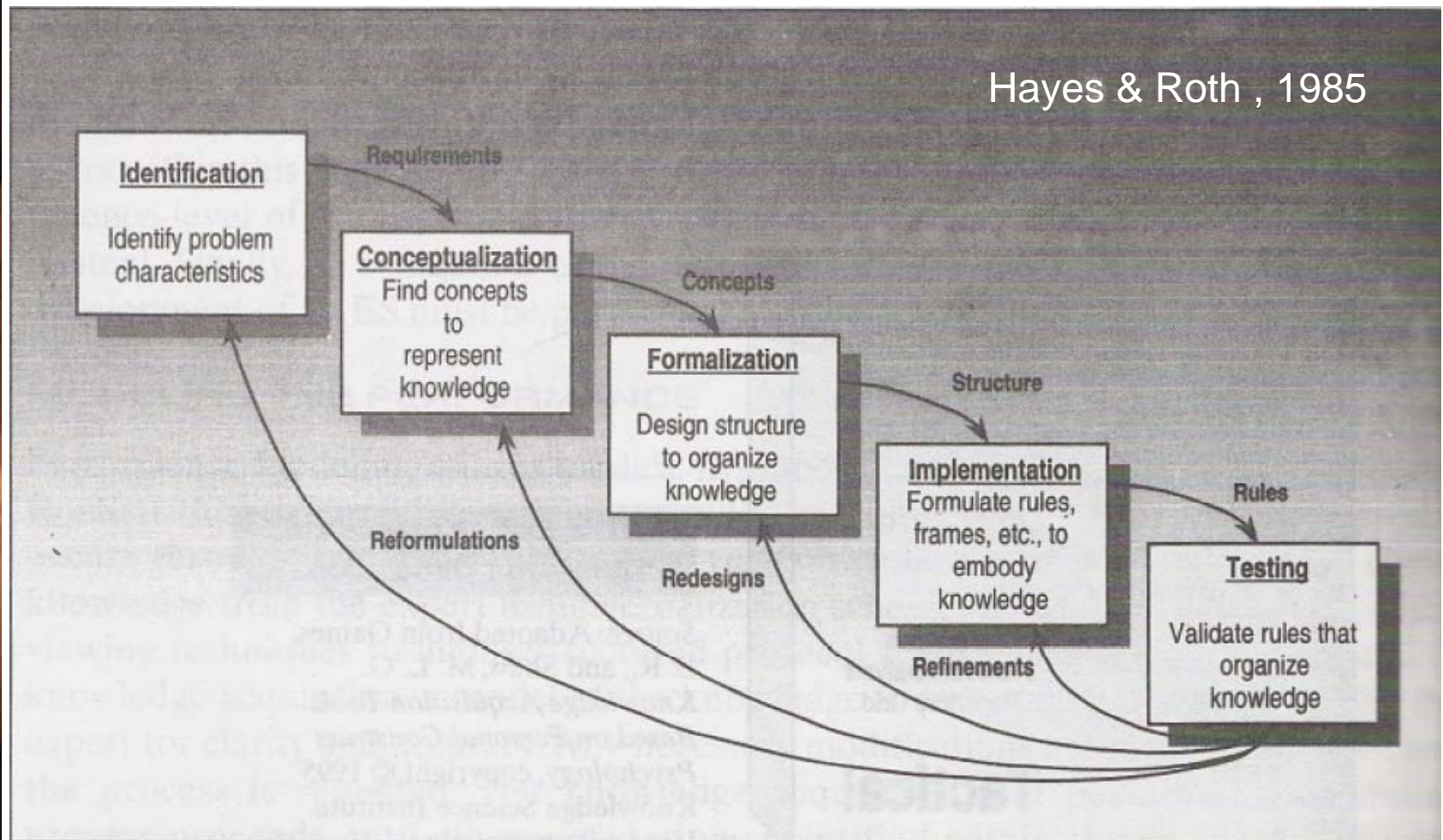




Dimension of knowledge Acquisition

- KE Driven
 - Knowledge engineer interact with the expert
 - Techniques : interviewing, protocol analysis , repertory Grid method
- Expert Driven
 - Expert encodes his/her own expertise and knowledge
 - Techniques :Visual Modeling
- Machine Driven
 - Focus on AI and machine learning

Stage of Knowledge acquisition

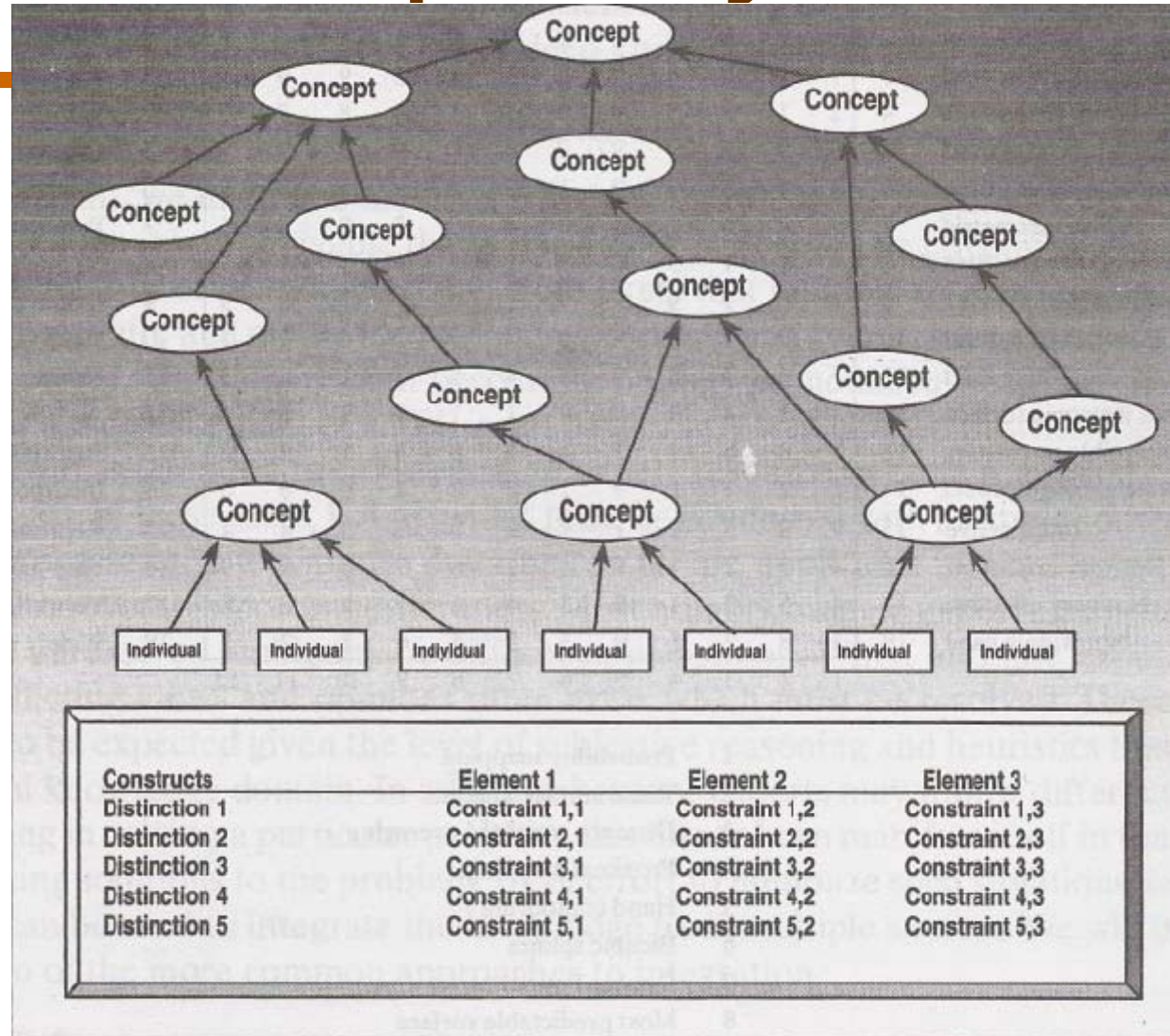




Elicitation techniques

- Interviewing technique
 - Unstructured
 - Structured
- Verbal protocol analysis
 - Step by step information processing and decision making behavior by an expert during a specific task
- Repertory Grid Method
 - Kelly (1955) , “ personal scientist with his/her own personal model”

Repository Grid



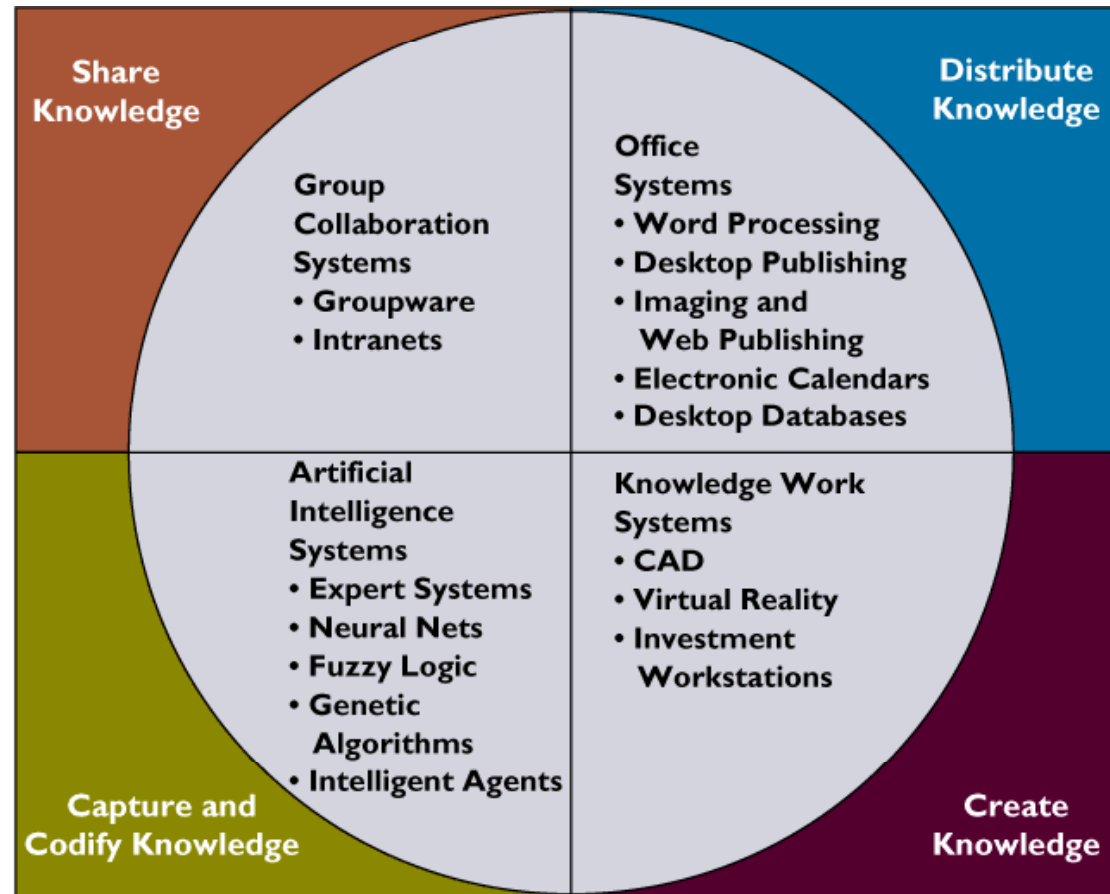
Knowledge Base Validation Measures and Techniques

- **Accuracy.** How well does the system reflect reality? How correct is the knowledge in the knowledge base?
- **Adaptability.** Possibilities for future development or changes.
- **Adequacy.** The portion of the necessary knowledge that is included in the knowledge base.
- **Appeal.** How well the knowledge base matches intuition and stimulates thought and practicability.
- **Breadth.** How well is the domain covered?
- **Depth.** The degree of the detailed knowledge.
- **Face validity.** How credible is the knowledge?
- **Generality.** Capability of a knowledge base to be used with a broad range of similar problems.
- **Precision.** Capability of the system to replicate particular system parameters. Consistency of advice and coverage of variables in the knowledge base.
- **Realism.** Accounting for the relevant variables and relations. Similarity to reality.
- **Reliability.** The frequency of system predictions that are correct.
- **Robustness.** Sensitivity of conclusions to model structure.
- **Sensitivity.** The impact of changes in the knowledge base on the quality of outputs.
- **Technical/operational.** Goodness of the assumptions, context, constraints, and conditions.
- **Turing test.** Ability of a human evaluator to identify whether a given conclusion is made by a real expert or a computer.
- **Usefulness.** How adequate the knowledge is (in terms of parameters and relationships) for solving problems correctly.
- **Validity.** The capability of the knowledge base for producing empirically correct predictions.



infrastructure

IT Infrastructure for Knowledge Management



IT Infrastructure
for Knowledge
Management

Networks

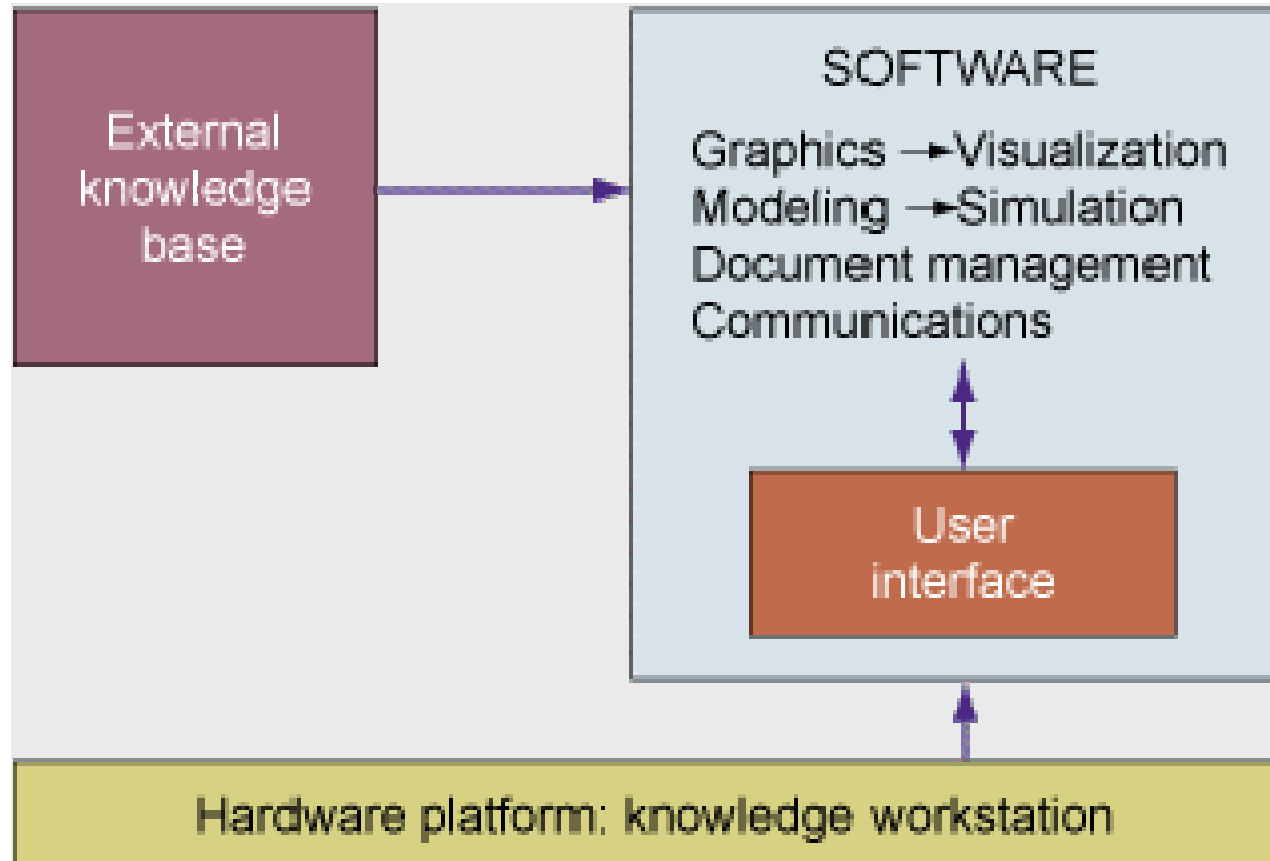
Databases


Processors

Software

Internet
Tools

Requirements of Knowledge Work Systems





Examples of Knowledge Work Systems

- Computer-aided design (CAD)
- Virtual reality systems
- Virtual Reality Modeling Language (VRML)
- Investment workstations



Sharing Knowledge: Group Collaboration Systems and Enterprise Knowledge Environments

- Groupware
- Intranets and Enterprise Knowledge Environments
- Enterprise information portals
- Team ware

An Enterprise Information Portal

